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PUMP AND WELL SYSTEM

HANDBOOK

VALE DISTRICT

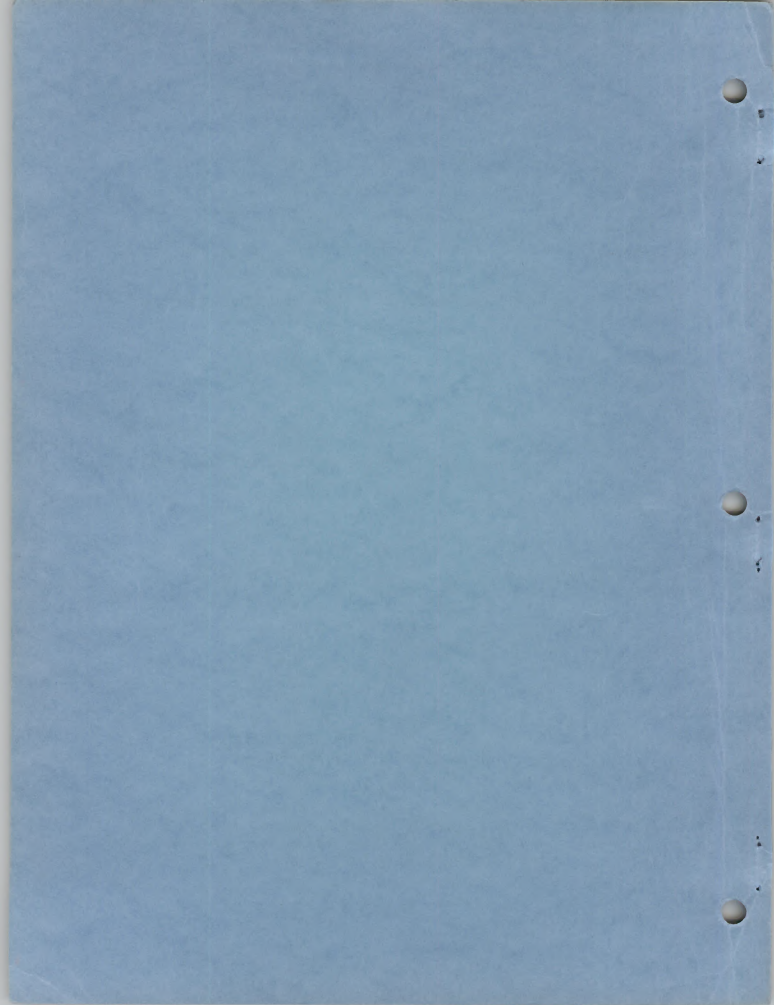
Prepared by

Deane Mahan, Supervisory Range Technician

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Bureau of Land Management
Oregon-Washington State Office

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INFORMATION BOOKLET PREPARED FOR THE CONSTRUCTION
OF A WELL INSTALLATION

PREPARED BY DEANE MAHAN, SUPVISORY RANGE TECHNICIAN,
VALE, OREGON FOR THE BUREAU OF LAND MANGEMENT

To simplify information, trade names have been used in this handbook. No endorsement of named products is intended nor is criticism implied of similar products which are not mentioned.

INTERNATIONAL SOCIETY FOR THE STUDY OF

OF A NEW DISCOVERY

AND ALSO BY OTHER NAMES, SUCH AS THE NEW DISCOVERY

ALL OTHERS ARE THE SAME AS THE NEW DISCOVERY

To simplify matters, this new discovery is
in this country. The discovery is not
a discovery but is a discovery of a new
product which is not new.

FOREWORD

PURPOSE OF THIS BOOKLET IS TO HELP PLAN AN EXTENSIVE WELL SYSTEM, USING IN GENERAL, VARIOUS FACTORS INSTRUMENTAL TO THE PLANNING OF ONE.

NO ATTEMPT IS INTENDED TO SPECIFY ANY PARTICULAR WELL SYSTEM BUT TO USE ESSENTIAL PORTIONS OF ESTABLISH ONES TO HELP OTHERS TO PLAN.

THIS BOOKLET MAY HELP OUR OWN PERSONNEL IN THEIR OWN PLANNING AND EXECUTION OF SAME.

COMPILED AS OF MAY 25, 1966, FROM DATA USED IN AND BY THE VALE GRAZING DISTRICT, NO. 3, OREGON.

PRICES SHOWN IN THIS BOOKLET ARE QUOTED FROM INFORMATION USED THROUGH THE FISCAL YEAR 1966.

REPORT

REPORT OF THE BOARD OF DIRECTORS OF THE
UNITED STATES OF AMERICA, 1964
PLANNING OF THE

AN ATTEMPT IS MADE TO PRESENT A SUMMARY OF THE
NOT TO THE EXECUTIVE BOARD OF THE UNITED STATES OF AMERICA
AND

THE BOARD OF DIRECTORS OF THE UNITED STATES OF AMERICA
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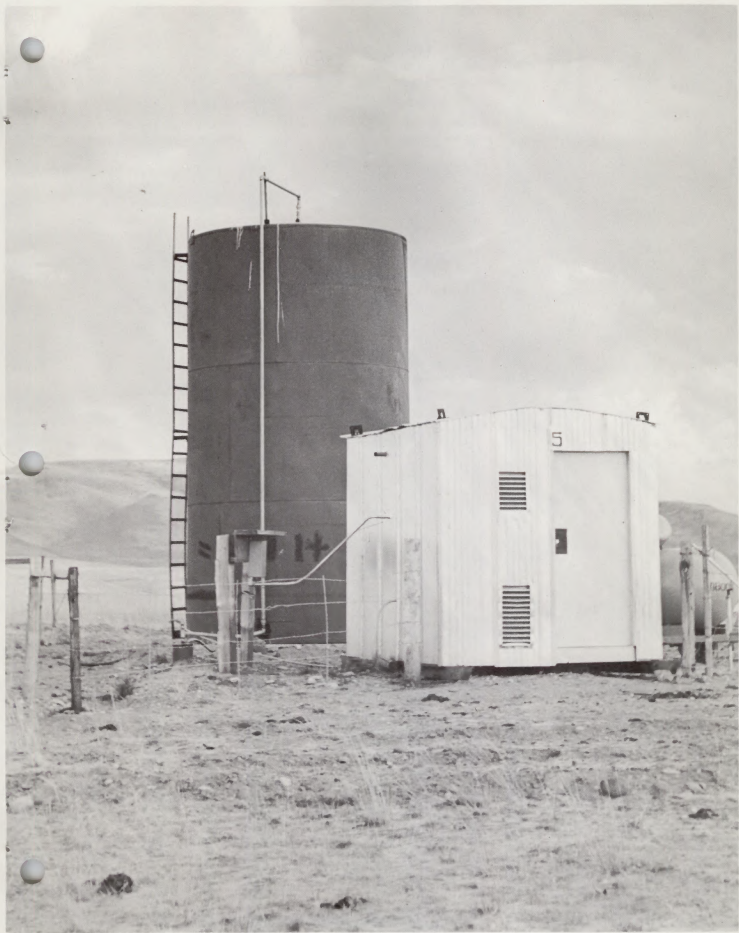
UNITED STATES OF AMERICA, 1964
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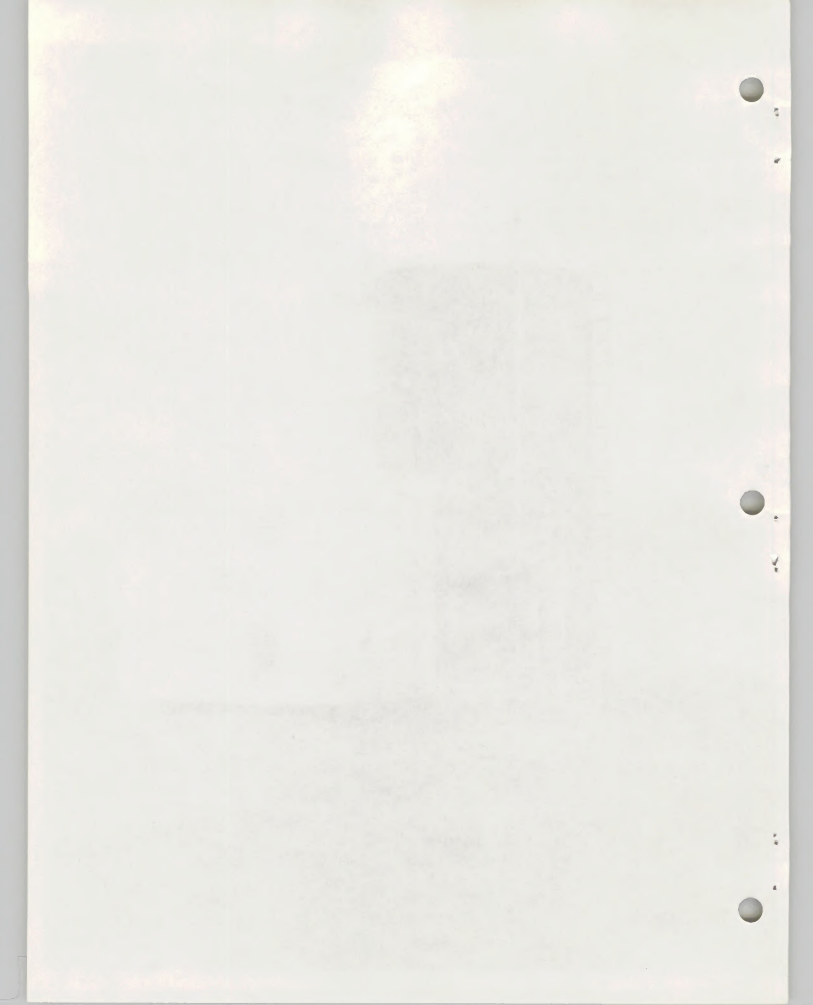
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WELL INSTALLATION

This photo shows a typical well installation on the range near Jordan Valley, Oregon.

A well is shown with a sanitary cap; pipe leading from it to the tank, up and into the top.

A pump control center at the well with a conduit leading from it to the well top and to the generator house on the right.

The generator house is of frame construction. Built on skids to move into place whenever needed and with lift irons at the top to enable it to be picked up by a crane whenever possible. The lift irons have steel rods which run down at each corner into and tied to each skid.

On the right of the building the 1,000 gallon L.P. Gas is shown.

A barbed wire fence, with a gate at the right of the building, is shown; this is to protect the installation from cattle rubbing and breaking essential items. Ventilators are shown in building to left of door. Ventilators are in front also to let freedom of cool outside air to circulate. Later houses have screen side openings which let the escape of hot air rising to the ceiling.

WELL EXPLANATION

This shows a typical well installation on the typical
near Jackson Valley, Oregon.

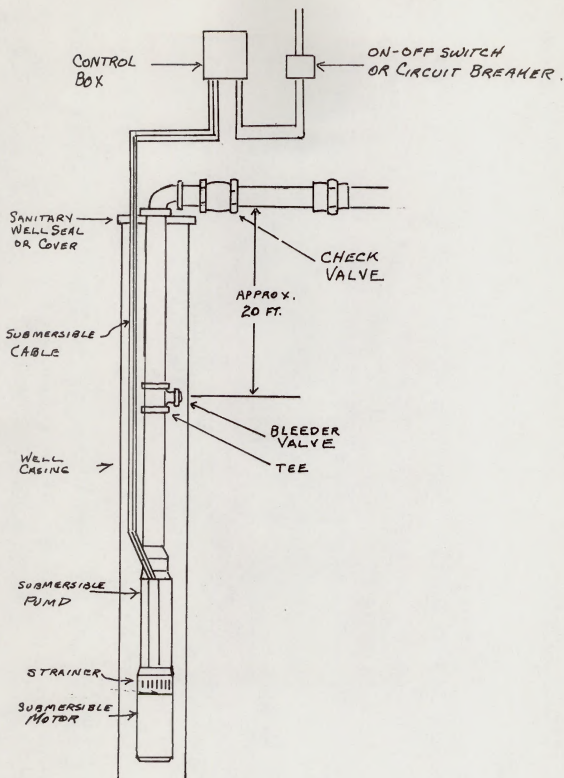
A well is shown with a hand-drawn well pipe leading from it
to the tank, up and over the top.

A pump control center is shown with a control leading
from it to the well, up and to the concrete house on the right.

The gasometer below is of known construction. While it
while it goes into place wherever needed and with first floor
the top to handle it. It is fitted up with a gasometer house
the. The first floor house above with the house on each side
out into and find to each side.

On the right of the building the house below is
shown.

A building with house, with a gasometer on the right of the house.
log, is shown; this is to provide the house with a gasometer
control and house control system. The house is shown in
building on left of house. The house is shown in
house on right of house. The house is shown in
house with house, which is the house of the house to
the house.



PUMP & WATER SYSTEMS	
SUBMERSIBLE PUMP	
5/25/6	DM.

SUBMERSIBLE PUMP

A submersible pump is similar to the turbine with impellers or stages. With a turbine the power is from the surface of the ground where the motor is located; with a turbine submersible the motor is located at the bottom of the well with the pump above it pushing the water to the surface making it easier and requires less power.

The submersibles come normally in two sizes, a four (4) inch, and a six (6) inch. It is powered principally with a "Franklin" 4 or 6 inch motor; but in some cases there will be found an "U.S." motor.

The pump referred to in this booklet are principally a four (4) inch diameter submersible type which should be purchased basically with a 4 inch pump control box and a splicing kit. However, it will be found that companies some times do not furnish the above as a kit unit, so that the control box may have to be purchased separately. Be sure that this box matches the requirements of the pump motor, as the manufacturer recommends or requires.

It is well that uniformity of pumps, motors, control boxes, etc. be maintained. This will simplify the ordering of parts for maintenance.

The control box should be as simple as possible, equipped with a starting capacitor, starting relay and an automatic over-load protection. These units should be of the "plug-in" type which makes replacement quick and easy.

Each unit should be equipped with a lightning arrester, (one arrester for 1 single phase and 2 lightning arresters for 3 phase).

The submersible pump should always be tested just previous to installation. Wires should be tested and checked for proper placement and connection to the control box and as well to the pump.

The cable after splicing to the pump leads should be carefully placed against the pump and fasten with careful placed cable fasteners, to prevent abrasive or cutting action, and then fasten not more than 20 feet of cable at a time. Regular cable fasteners can be secured consisting of 18" length of number 10 Thermo-plastic wire for fastening, and a rubber pad for the cable protection. This pad can be furnished for the various sizes of cable. Or stainless steel clamps may be substituted for the above wire clamp. This unit should consist of a cast saddle guard, rubber pad, and "Band-It" stainless steel strap 3/8" wide.

Sanitary well seals are a must requirement for a well. A submersible type can be secured for various well sizes from 4 to 8 inches in diameter. The seal will allow the pipe column, and the cable to the well and if an air vent is necessary will have an opening for it.

January will not be a very important one for the
industry. The only thing that will be important
to the industry is the fact that the industry will
not be able to do anything for the industry.

PRICE SCHEDULE

FOR

DEEP WELL SUBMERSIBLE PUMPS

Pumps quoted here are in accordance with a government open contract, with the following conditions and specifications.
(F.Y. 1966)

Description

Deep well submersible pumps in accordance with specifications that follows, complete with electric motor and accessories and with minimum capacities indicated below based on zero discharge pressure.

Item No.	HP Rat.	V., Freq. & Phase	GPH Cap.	Lift Cap.	Unit	FOB Vale, Ore.	FOB (Plant Contractors)
1.	1	208/60/3	600	260'	Each	295.79	291.06
2.	2	208/60/3	600	400'	Each	265.56	360.83
3a.	3	208/60/1	600	400'	Each	489.89	480.43
3b.	3	208/60/3	600	500'	Each	418.29	408.83
4a.	5	208/60/1	500	1000'	Each	520.71	511.25
4b.	5	208/60/3	500	1000'	Each	415.89	406.43

(FOR YOUR GUIDANCE & INFORMATION ONLY)

Contractor

Berkeley Pump Company
829 Bancroft Way
Berkeley, California 94710
Phone: (415) 843-9400

(For F.Y. 1966 Only)

SPECIFICATIONS FOR DEEP WELL SUBMERSIBLE PUMP

1. General:

Deep well submersible pump shall consist of an assembly of pump and motor to fit 4" I.D. well casing. Each pump shall be furnished with controls and accessories as herein specified and shall be for operation for 208/60/1 or 208/60/3 power (as specified) supplied by a 120/208/60/3 LP gas-driven generator set. An installation and maintenance manual, including wiring diagrams for motor, control panel and low water cut-off, shall be furnished with each pump.

2. Pump:

Pump shall be built, tested, and shipped by a manufacturer who has been regularly engaged in the production of such equipment for the past ten years and who has parts and service facilities available in the Pacific Northwest. Pump and motor shall be one complete assembly, must be easily serviceable in the field, and shall include a trouble-free check valve. Bowls, bearings, moving parts and intake screen shall be corrosion and abrasion resistant. Pump outlet shall be not less than 1½" IPT.

3. Motor:

Motor shall be permanently lubricated and American-made to NEMA and ASA standards. Motor leads shall be protected to top of pump assembly. Single-phase motor shall be provided with necessary capacitor(s) and centrifugal or thermal switch.

4. Accessories and Controls:

Each pump shall be provided with a control panel or panels containing a magnetic starter with overload protection, an adjustable pneumatic delay relay to provide 2 minutes delay from energization of power circuit to starter pull-in, 3-pole circuit breaker and OFF-AUTO switch. Magnetic starter and relay coils shall be for operation on, and rated at not less than, 120 volts. Circuit breaker and overload heaters for the magnetic starter shall be precisely selected for full-load operation of the motor at 215 volts. Delay relay shall be similar to Agastat NE-11. A floatless liquid level controller shall be furnished with each pump to limit draw-down of the well. Controller shall be for 120-volt operation and shall be furnished with 2 probes, less cables. All electrical equipment required herein shall be provided with NEMA Type 1 enclosures having suitable knockouts for wiring.

Section 1. General Principles

1. General

These rules shall apply to all cases which come before the court in the exercise of its jurisdiction. They shall be subject to the power of the court to make such amendments as may be necessary to carry out the purposes of these rules. The court may also make such amendments as may be necessary to carry out the purposes of these rules. The court may also make such amendments as may be necessary to carry out the purposes of these rules.

2. Scope

These rules shall apply to all cases which come before the court in the exercise of its jurisdiction. They shall be subject to the power of the court to make such amendments as may be necessary to carry out the purposes of these rules. The court may also make such amendments as may be necessary to carry out the purposes of these rules. The court may also make such amendments as may be necessary to carry out the purposes of these rules.

3. Definitions

These rules shall apply to all cases which come before the court in the exercise of its jurisdiction. They shall be subject to the power of the court to make such amendments as may be necessary to carry out the purposes of these rules. The court may also make such amendments as may be necessary to carry out the purposes of these rules.

Section 2. Procedure

These rules shall apply to all cases which come before the court in the exercise of its jurisdiction. They shall be subject to the power of the court to make such amendments as may be necessary to carry out the purposes of these rules. The court may also make such amendments as may be necessary to carry out the purposes of these rules. The court may also make such amendments as may be necessary to carry out the purposes of these rules.

Wiring Installation

The submersible must be connected directly to the control box. The tables are self explanatory in using the correct wire size. If required cable length between two sizes, use the heavier of the two sizes (smaller). Use of wire size smaller than recommended, or of cable length longer than recommended in the table will void possibly any warranty of the pump.

Voltage at the control box, or starter must not be below the following :

Single-Phase : 105 volts on 115 volt line, or
 210 volts on 230 volt line.

Three-Phase : 200 volts on 220 volt line, or
 400 volts on 440 volt line.

If it is necessary to set the pressure tank some distance from the well, the pressure switch and electrical controls must be installed at the tank. If the distance is not too great the electrical control box can be installed at the well, and the pressure tank and pressure switch can be installed together. With this arrangement for a single-phase only two wires are required from the pressure switch to the control box. If the control box is installed with the tank three (3) wires are required from the control box to the well.

The following tables are helpful in the selection of wire, the resistance, etc., in correlation with motor rating and phase.

SINGLE-PHASE MOTORS

Maximum Pump Drop Cable Length In Feet

MOTOR RATING		WIRE SIZE							
H.P.	Volts	#14	#12	#10	#8	#6	#4	#2	M#0
1	230	165	260	415	660	1050			
1½	230	130	200	315	500	800	1270		
2	230	95	150	240	380	600	960		
3	230		100	155	245	395	625	990	
5	230			125	195	315	500	790	1250
7½	230				150	240	380	610	970

MAXIMUM SUPPLY LENGTH OF WIRE IN FEET.
(Control Box to load center, or transformer)

MOTOR RATING		WIRE SIZE							
H.P.	Volts	#14	#12	#10	#8	#6	#4	#2	#0
1	230	40	65	105	165	265	420	665	1060
1½	230	30	50	80	125	200	320	505	805
2	230	25	40	60	95	150	240	385	610
3	230		25	40	60	100	160	250	400
5	230			30	50	80	125	200	310
7½	230				40	60	95	155	245

TABLE 1

TABLE 1

TABLE 1				TABLE 1			
1	2	3	4	5	6	7	8
100	100	100	100	100	100	100	100
100	100	100	100	100	100	100	100
100	100	100	100	100	100	100	100
100	100	100	100	100	100	100	100
100	100	100	100	100	100	100	100
100	100	100	100	100	100	100	100
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100	100	100	100	100	100	100	100

TABLE 1

TABLE 1				TABLE 1			
1	2	3	4	5	6	7	8
100	100	100	100	100	100	100	100
100	100	100	100	100	100	100	100
100	100	100	100	100	100	100	100
100	100	100	100	100	100	100	100
100	100	100	100	100	100	100	100
100	100	100	100	100	100	100	100
100	100	100	100	100	100	100	100
100	100	100	100	100	100	100	100

THREE-PHASE MOTORS

MAXIMUM PUMP DROP CABLE LENGTH IN FEET

(MOTOR TO CONTROL BOX OR STARTER)

Motor Rating		Wire Size							
H.P.	Volts	#14	#12	#10	#8	#6	#4	#2	#0
1½	220	695	1100	1750					
2	220	480	760	1210	1930				
3	220	350	550	875	1395	2220			
5	220	225	355	565	900	1430	2280		
7½	220		240	385	615	975	1550	2470	
10	220			280	450	715	1140	1810	2750

MAXIMUM SUPPLY WIRE LENGTH IN FEET

(STARTER OR CONTROL BOX TO LOAD OR TRANSFORMER)

Motor Rating		Wire Size							
H.P.	Volts	#14	#12	#10	#8	#6	#4	#2	#0
1½	220	175	275	435	700	1105	1760		
2	220	120	190	300	480	765	1215		
3	220	85	140	220	350	555	880	1400	
4	220	55	90	140	225	360	570	910	1380
7½	220		60	95	155	255	385	615	980
10	220			70	115	180	285	455	725

OHM DROP PER 1,000 FEET OF WIRE

Wire Size	#14	#12	#10	#8	#6	#4	#2	#0
OHMS Per								
1,000 Ft.	2.575	1.619	1.018	.641	.396	.248	.156	.0982

Use of smaller wire than shown in the tables will cause low starting voltage and result in early failure of unit.

For use of submersible wire before purchasing it will be well to check with manufacturer of pump cable selection charts for correct size of cable for the pump you buy. Different manufacturers in their warranty require a size that may differ slightly from the other manufacturer of pumps.

Usually submersible cable is water proof material such as rubber bonded-neoprene covered, or thermo-plastic covered.

Two of smaller size were shown in the latter case.
The starting material was a low quality lignite of coal.

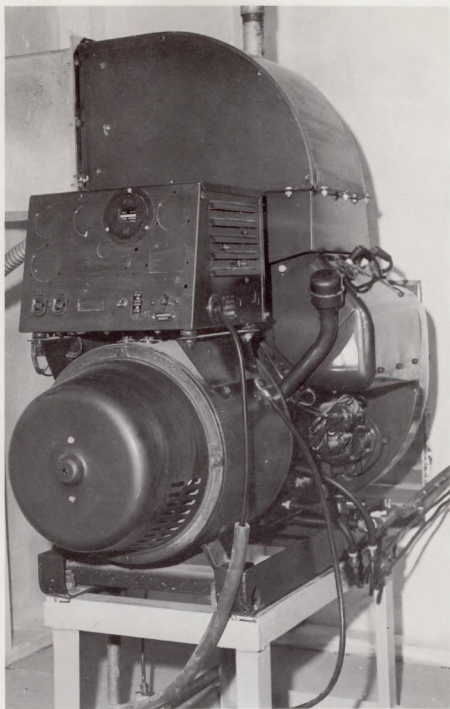
The use of ammonia as a catalyst was suggested. It will be
well to show this reaction of ammonia with lignite. The
reaction was also shown for the coal. The reaction was
observed in this reaction. The reaction was also shown
slightly from the same material of coal.

Small quantities of water were used in the reaction.
As the reaction proceeded, the reaction became more

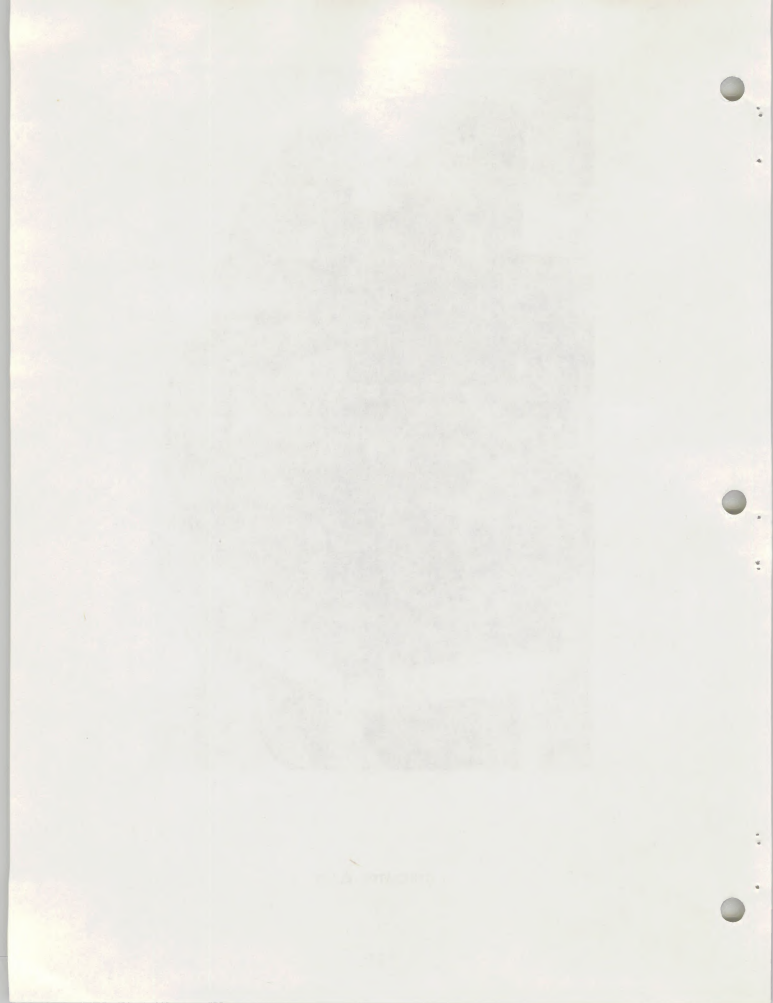


A VALE TYPICAL GENERATOR BUILDING

THE UNIVERSITY OF CHICAGO



A GENERATOR PLANT



ELECTRIC GENERATOR

At the present time we are purchasing with an open end Government contract three types or capacities of electric generator.

Description

Generating set, electric 120/208 volts, 3 phase, L. P. (Liquid Petroleum) gas powered, including accessories.

<u>Item</u> <u>No.</u>	<u>Cap.</u>	<u>Unit</u>	<u>Make</u>	<u>F.O.B.</u> <u>Vale, Ore.</u>	<u>FOB (Plant)</u> <u>Contractor's</u>
1.	3.5 KW	Each	Kohler	\$ 698.00*	\$ 667.25
2.	7.5 KW	Each	Kohler	\$ 992.00*	\$ 951.06
3.	10.0 KW	Each	Kohler	\$1220.50*	\$1172.49

*Prices are under Government contract effective in fiscal year 1966 only, pay terms net.

Contractor

The Instrument Laboratory Co.
1316 South East 7th Avenue
Portland, Oregon 97214

STANDARD FORMS

As the Bureau has no standard form for the use of Government, standard forms are used in the following manner:

Standard Form

Standard Form 100-100, which is used in the following manner:

Form	Size	Color	Material	Weight	Price
100-100	8 1/2 x 11	White	Standard	100 gms	\$ 1.00
100-100	8 1/2 x 11	White	Standard	100 gms	\$ 1.00
100-100	8 1/2 x 11	White	Standard	100 gms	\$ 1.00
100-100	8 1/2 x 11	White	Standard	100 gms	\$ 1.00

Standard Form 100-100, which is used in the following manner:

Standard Form

The following information is given for the use of the Bureau:

GENERATOR:

The generator shall be rotating armature, direct connected to the engine crankshaft and to include auxiliary field and voltage stabilizer to assure good motor starting characteristics. It shall be drip-proof and rated as required for continuous duty at 3.5 KW, 7.5 KW, and 10 KW, 80% power factor, with inherent voltage regulation of +5%. Frequency regulation to be within 3 cycles maximum. Cranking protection, locked rotor protection and field circuit breaker shall be provided.

INSTRUMENTS:

A shock-mounted instrument panel shall contain the oil pressure gage, a running time meter (0 to 9999.9 hours), 120 V grounding type duplex receptacle, cranking reset button, the battery charge rate regulator and start and stop switch for manual operation. The control panel shall include a 4-position switch to allow selection of the following operations: Automatic, stop, check and hand crank.

ACCESSORIES:

All accessories needed for the proper operation of the set shall be furnished. These shall include battery cables, emergency starter rope, muffler and exhaust tubing.

The set shall be equipped with a crank-case oil-level regulator and a ten-gallon reserve oil supply tank with float assembly, complete with 3 feet of tubing and all necessary fittings.

The plant shall be mounted on heavy duty shock or anti-vibration mounts.

The set shall be furnished LESS fuel tanks

The set shall be furnished LESS starting batteries.

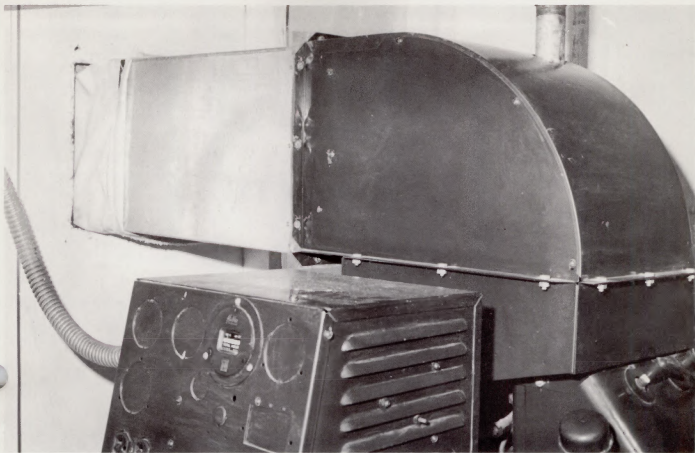
An installation and maintenance manual shall be furnished with each generator.

CRANKING LIMITER:

A cranking limiter shall be provided to protect the batteries and starting circuit. It will open the starting circuit in approximately 45 seconds if the plant has not started within that time. Locked-rotor protection shall open starting circuit immediately if engine will not crank.

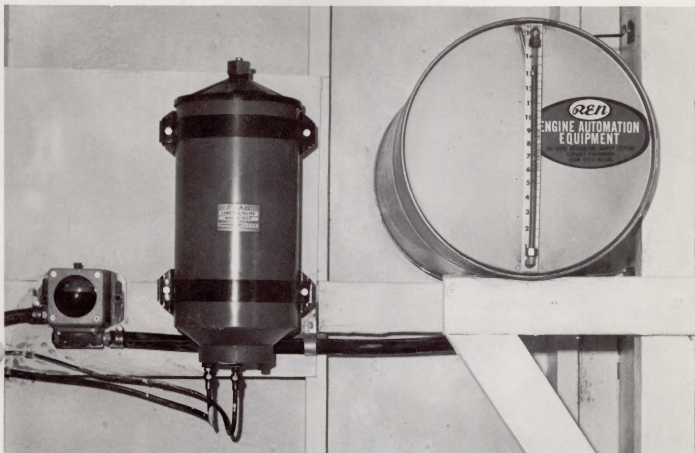
USE:

These generators are to be utilized as power source for deep well submersible pumps.



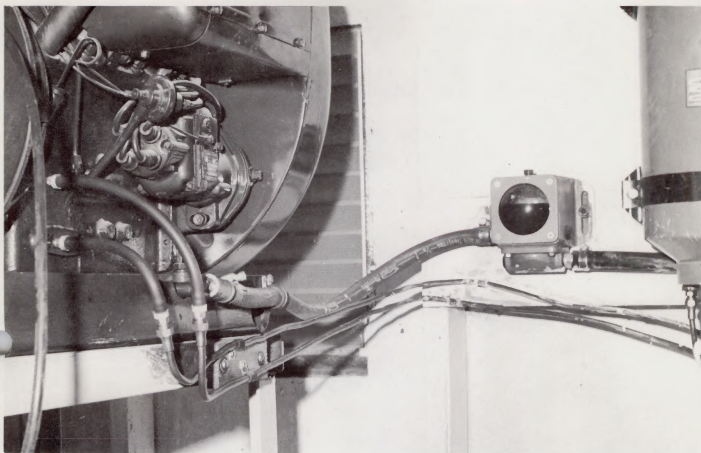
AIR EXHAUST TO OUTSIDE

THE HISTORY OF THE UNITED STATES



FRAM OIL FILTER AND REN ENGINE
AUTOMATION EQUIPMENT STORAGE

WASHINGTON NATIONAL ARCHIVES
800 OIL FIELD AND RIG CO-OP



REN OIL LEVEL

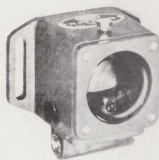
751 119 108

Manufactured by POWER PLUS CORPORATION
4462 E. Washington Blvd. Los Angeles 23, California
Mid-Continent Distributor REN EQUIPMENT CO.
201 E. Stoner Shreveport, Louisiana
West Coast and Rocky Mountain Distributor NELSON-DUNN INC.
4450 E. Washington Blvd. Los Angeles 23, California

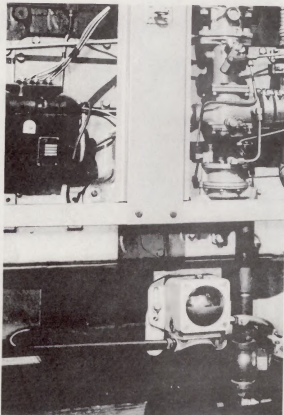


OIL LEVEL REGULATOR

MODEL **RB**



REN OIL LEVEL REGULATOR MODEL RB
FOR UNIVERSAL ENGINE APPLICATION



The REN Oil Level Regulator automatically maintains the correct oil level in the crankcase of internal combustion engines. From a separate supply tank at or near the engine, the Regulator delivers only that amount of oil required by the engine. Especially designed for application to engine crankcases, the REN Oil Level Regulator employs a ruggedly designed float valve which is insensitive to vibration. The unit is designed for universal application.

The Model RB REN Oil Level Regulator is intended for mounting on or adjacent to engine crankcases with the centerline of the window in the regulator adjusted to the same level as that to be maintained. The Model RB REN Oil Level Regulator is usually installed on the Model RK-2 pan mounting bracket which is bolted in place by using two of the engine oil pan bolts.

The universal mounting kit which includes pan mounting bracket, hose fittings and supply line hose is furnished. (See catalog sheet on Model RA REN Oil Level Regulator for direct adapter installations.)

The Model RB REN Oil Level Regulator is frequently installed with a REN Slow-Flow Meter which accurately records the engine lubricating oil make-up requirements.

Provision is made for the installation of a pressure equalizing vent line when installing on engines which operate with a negative pressure in the crankcase or on engines which have a tendency to build up pressure in the crankcase.

Supply tanks and stands are available in 15, 30 and 55 gallon sizes. (See catalog pages on supply systems.)

The REN Oil Level Regulator body is a heavy aluminum casting. A quarter inch thick plexi-glass sight window is provided in the front of the casting to indicate visibly the accurate function of the regulator and to show the oil level. To insure the cleanliness of the oil to be delivered to the engine crankcase, a fine mesh screen and sediment bowl are used. Since the regulator valve is continually immersed in clean oil, wear and vibration considerations are eliminated.

Savings of up to 50% in oil consumption are proved by thousands of REN Oil Level Regulator installations. The REN Regulator eliminates the most costly phase in the operation of stationary engines; that of frequent manual filling and checking of crankcases. Protection is provided against damage frequently caused by manual filling of crankcases. Intervals between engine overhauls are frequently extended as much as 50%. In consideration of the above factors, the payout of the REN Oil Level Regulator is usually figured at less than one year.

24. 10/10/2001

1. The purpose of this document is to provide information regarding the activities of the [redacted] and the [redacted] in the [redacted] area. This information is being provided to you for your information only and is not to be used for any other purpose.

2. The [redacted] and the [redacted] are both active in the [redacted] area. The [redacted] is a [redacted] and the [redacted] is a [redacted]. Both are active in the [redacted] area and are both active in the [redacted] area.

3. The [redacted] and the [redacted] are both active in the [redacted] area. The [redacted] is a [redacted] and the [redacted] is a [redacted]. Both are active in the [redacted] area and are both active in the [redacted] area.

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5. The [redacted] and the [redacted] are both active in the [redacted] area. The [redacted] is a [redacted] and the [redacted] is a [redacted]. Both are active in the [redacted] area and are both active in the [redacted] area.

6. The [redacted] and the [redacted] are both active in the [redacted] area. The [redacted] is a [redacted] and the [redacted] is a [redacted]. Both are active in the [redacted] area and are both active in the [redacted] area.

7. The [redacted] and the [redacted] are both active in the [redacted] area. The [redacted] is a [redacted] and the [redacted] is a [redacted]. Both are active in the [redacted] area and are both active in the [redacted] area.

8. The [redacted] and the [redacted] are both active in the [redacted] area. The [redacted] is a [redacted] and the [redacted] is a [redacted]. Both are active in the [redacted] area and are both active in the [redacted] area.



GENERATOR ACCESSORIES

Miscellaneous items and cost - used by the Vale District:

- | | |
|---|---------|
| 1. Ren - Oil Level Regular | \$68.00 |
| Model R.B.K. Complete with Installation Kit | |
| 2. Ren - 15 Gallon Tank With Calibrated Sight Gauge | |
| Model RS-1 | |

ABOVE ITEMS AVAILABLE FROM

Nelson Dunn Inc.
4450 East Washington Street
Los Angeles, California

- | | |
|-------------------------------|---------|
| 3. Filer, Oil - Fram Lube | \$34.00 |
| Model F175-P | |
| 4. Switch, Main Disconnect | \$ 3.75 |
| Make - Federal | |
| Catalogue #1370SN1 | |
| 5. Breaker - Federal - 40 AMP | \$ 6.00 |

SWITCH AND BREAKER CAN BE PURCHASED FROM

Electrical Supply Houses

- | | |
|-------------------------------|---------|
| 6. Delay-Relay and Receptable | \$ 2.50 |
| Make - Ampente #115N0120 | |

CAN BE PRUCHASED FROM ANY

Radio Supply House

RESEARCH RESULTS

Microfilm copies of the following items are available:

- 1. No. 10 - All items (1940-1945)
- 2. No. 11 - All items (1946-1950)
- 3. No. 12 - All items (1951-1955)

ADDITIONAL INFORMATION

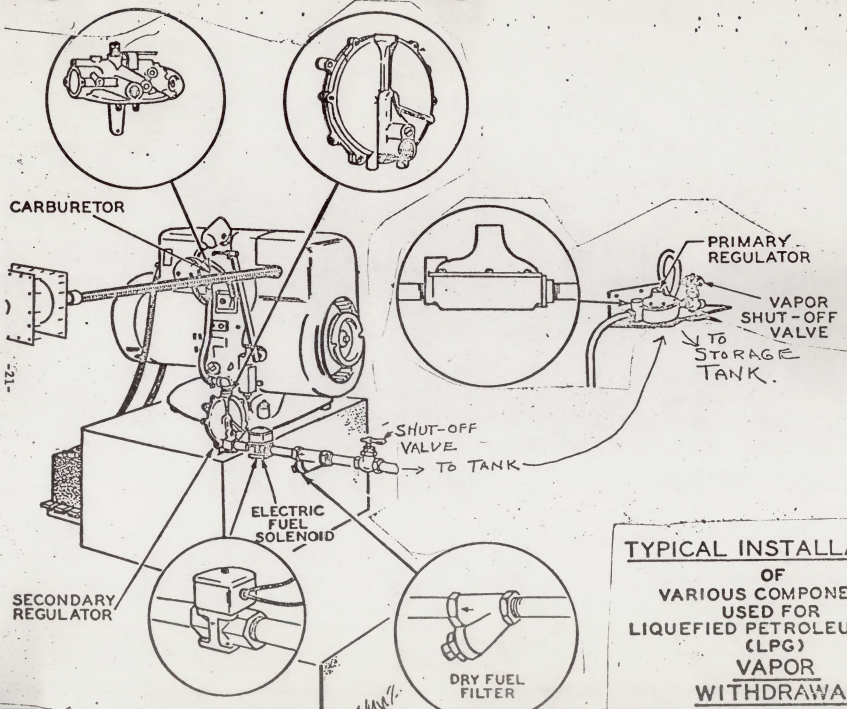
Microfilm copies of the following items are available:

- 1. No. 13 - All items (1956-1960)
- 2. No. 14 - All items (1961-1965)
- 3. No. 15 - All items (1966-1970)
- 4. No. 16 - All items (1971-1975)

ADDITIONAL INFORMATION

Microfilm copies of the following items are available:

- 1. No. 17 - All items (1976-1980)
- 2. No. 18 - All items (1981-1985)
- 3. No. 19 - All items (1986-1990)
- 4. No. 20 - All items (1991-1995)



TYPICAL INSTALLATION
OF
VARIOUS COMPONENTS
USED FOR
LIQUEFIED PETROLEUM GAS
(LPG)
VAPOR
WITHDRAWAL

1. INTRODUCTION

2. THEORY OF THE EXPERIMENT

3. EXPERIMENTAL PROCEDURE

4. RESULTS AND DISCUSSION

5. CONCLUSIONS

6. REFERENCES

7. APPENDICES

8. ACKNOWLEDGMENTS

9. NOTES

10. INDEX

11. TABLES

12. FIGURES

13. EXPLANATIONS

14. QUESTIONS

15. ANSWERS

16. EXERCISES

17. PROBLEMS

18. PROJECTS

19. RESEARCH

20. CONCLUSIONS

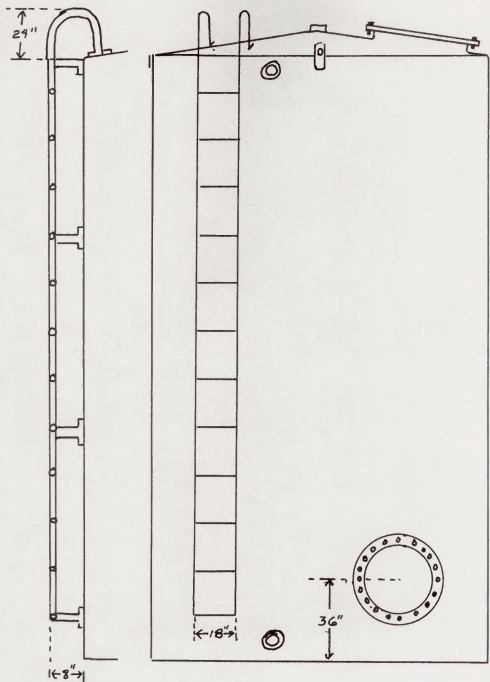


A TROLLY TRACK LAYOUT

This track mounted, diagonal, across and fastened to rafters is a heavy duty sliding door trolley with a single hanger and roller, converted, with a ring attached. This ring is for the purpose of a hoist to hang from and to lift the generator and move it to the doorway where it can be placed into a pickup body easily.

20. 10. 1957

The first of the two main groups of the
population of the island of St. John
is the group of the people who are
of the same race and the same
language as the people of the
mainland of the island of St. John.



MANHOLE & COVER

PUMP & WELL SYSTEM	
WATER TANK	
5/25/66	B.M.

CAPACITY OF WATER TANKS

Gauge	TANK CAPACITY (GALLONS)			
	5000	10,000	18,000	24,000
1	368	556	750	846
2	736			
3		1,668	2,250	2,538
4	1,473			
6	2,209	3,336	4,500	5,076
8	2,946			
9		5,004	6,750	7,614.27
10	3,682			
12	4,419	6,672	9,000	10,152
14	5,155			
15			11,250	12,691
18		10,000	13,500	15,229
21			15,750	17,767
24			18,000	20,310
Cost per tank	\$480.00	\$875.00	\$1,286.00	Est. @ \$1,800.00

TABLE 1. SUMMARY OF DATA

STATION	DATE	TIME	WIND	TEMP	REL. HUM.
1	1/1/54	0800	10	55	85
2	1/1/54	1200	15	60	80
3	1/1/54	1600	12	58	82
4	1/1/54	2000	8	52	88
5	1/2/54	0600	5	48	90
6	1/2/54	1000	10	55	85
7	1/2/54	1400	12	58	82
8	1/2/54	1800	8	52	88
9	1/3/54	0700	6	50	87
10	1/3/54	1100	11	56	83
11	1/3/54	1500	13	59	81
12	1/3/54	1900	9	53	86
13	1/4/54	0600	4	47	91
14	1/4/54	1000	9	54	84
15	1/4/54	1400	11	57	82
16	1/4/54	1800	7	51	89
17	1/5/54	0700	5	49	88
18	1/5/54	1100	10	55	85
19	1/5/54	1500	12	58	82
20	1/5/54	1900	8	52	87
21	1/6/54	0600	6	50	86
22	1/6/54	1000	11	56	83
23	1/6/54	1400	13	59	81
24	1/6/54	1800	9	53	86
25	1/7/54	0700	5	49	88
26	1/7/54	1100	10	55	85
27	1/7/54	1500	12	58	82
28	1/7/54	1900	8	52	87
29	1/8/54	0600	4	47	91
30	1/8/54	1000	9	54	84
31	1/8/54	1400	11	57	82
32	1/8/54	1800	7	51	89
33	1/9/54	0700	5	49	88
34	1/9/54	1100	10	55	85
35	1/9/54	1500	12	58	82
36	1/9/54	1900	8	52	87
37	1/10/54	0600	6	50	86
38	1/10/54	1000	11	56	83
39	1/10/54	1400	13	59	81
40	1/10/54	1800	9	53	86
41	1/11/54	0700	5	49	88
42	1/11/54	1100	10	55	85
43	1/11/54	1500	12	58	82
44	1/11/54	1900	8	52	87
45	1/12/54	0600	4	47	91
46	1/12/54	1000	9	54	84
47	1/12/54	1400	11	57	82
48	1/12/54	1800	7	51	89
49	1/13/54	0700	5	49	88
50	1/13/54	1100	10	55	85
51	1/13/54	1500	12	58	82
52	1/13/54	1900	8	52	87
53	1/14/54	0600	6	50	86
54	1/14/54	1000	11	56	83
55	1/14/54	1400	13	59	81
56	1/14/54	1800	9	53	86
57	1/15/54	0700	5	49	88
58	1/15/54	1100	10	55	85
59	1/15/54	1500	12	58	82
60	1/15/54	1900	8	52	87
61	1/16/54	0600	4	47	91
62	1/16/54	1000	9	54	84
63	1/16/54	1400	11	57	82
64	1/16/54	1800	7	51	89
65	1/17/54	0700	5	49	88
66	1/17/54	1100	10	55	85
67	1/17/54	1500	12	58	82
68	1/17/54	1900	8	52	87
69	1/18/54	0600	6	50	86
70	1/18/54	1000	11	56	83
71	1/18/54	1400	13	59	81
72	1/18/54	1800	9	53	86
73	1/19/54	0700	5	49	88
74	1/19/54	1100	10	55	85
75	1/19/54	1500	12	58	82
76	1/19/54	1900	8	52	87
77	1/20/54	0600	4	47	91
78	1/20/54	1000	9	54	84
79	1/20/54	1400	11	57	82
80	1/20/54	1800	7	51	89
81	1/21/54	0700	5	49	88
82	1/21/54	1100	10	55	85
83	1/21/54	1500	12	58	82
84	1/21/54	1900	8	52	87
85	1/22/54	0600	6	50	86
86	1/22/54	1000	11	56	83
87	1/22/54	1400	13	59	81
88	1/22/54	1800	9	53	86
89	1/23/54	0700	5	49	88
90	1/23/54	1100	10	55	85
91	1/23/54	1500	12	58	82
92	1/23/54	1900	8	52	87
93	1/24/54	0600	4	47	91
94	1/24/54	1000	9	54	84
95	1/24/54	1400	11	57	82
96	1/24/54	1800	7	51	89
97	1/25/54	0700	5	49	88
98	1/25/54	1100	10	55	85
99	1/25/54	1500	12	58	82
100	1/25/54	1900	8	52	87

SPECIFICATIONS

FOR

WATER STORAGE TANK

1. Tank, storage, water, vertical; constructed as follows and in accordance with the drawing attached. Dimensions and capacities are approximate.

18,000 Gallon

Cone height	12"	10 gauge steel
Tank height without cone	23'-9"	
Diameter of shell	11'-4"	3/16" steel
Diameter of tank		
Bottom plate	11"-6"	1/4" steel

10,000 Gallon

Cone height	10"	10 gauge steel
Tank height without cone	19'	
Diameter of shell	9'-6"	3/16" steel
Diameter of tank		
Bottom plate	9'-8"	1/4" steel

5,000 Gallon

Cone height	10"	10 gauge steel
Tank height without cone	14'	
Diameter of steel	7'-11"	10 gauge steel
Diameter of tank		
Bottom plate	8'	3/16" steel

2. Materials: All materials used in the fabrication of all items shall be new and of good commercial quality. With all carbon and weld spatter to be removed with a rotary type sander.

Tank must be water tight.

3. Various Miscellaneous Specifications:

A. Manhole and cover

1. 24 inch diameter opening.
2. With cover - 3/8" steel plate 30" diameter.
3. Ring and support - 1/4 inch steel plate.
4. Gasket - 1/8" rubber.
5. Bolts and holes - 1/2" x 1 1/2" galvanized M.B. on 3 inch centers.
6. Two manholes located on top and near the bottom approximately 36 inch above bottom.

B. Cone

1. To extend with the dimensions hereto before shown, with a pipe flange opening of 2 inches in center.

C. Pipe - Openings

1. All tappings indicated will be NPT welded pipe flanges in sizes indicated below.
2. Openings should be located on all tanks for use as desired.

Suggested as follows:

- a. One in center of cone 2" for tank air vent.
- b. One near top on side for inlet water line 2" diameter.
- c. One near bottom on side for a drainage plug, 2" diameter.
- d. An outlet approximately 6 inch above bottom on side for a water outlet for the pipe lines, 3 inch diameter.

D. Ladder

1. All steel construction with
2. Rungs, 3/4" x 18" round steel bars
3. Welded 18" apart to flat steel
4. Straps of 3/8" x 1 1/4" which
5. Begins at a point approximately 18" above bottom of tank, and
6. Extend 24" above top of tank as shown on tank and fastened back to tank.
7. Ladder to be fastened to side of tanks with brackets, 3/8" x 1 1/4" strap steel, allowing ladder to extend approximately 8" from tank.

E. Lift Lugs

1. Number of 2 each, 1/2" x 3" x 10"
2. Solidly welded to top and sides
3. So as to allow tank be picked up by crane.

F. Paint

1. Interior of tank to be painted with a coat of tasteless and odorless water resistant primer paint.
2. Exterior to be cleaned and primed with one coat of "Rustoleum" primer or equal.
3. Sides to be finished with a good grade of aluminum paint such as Quigleys Triple A. Paint description shown at end of this section.
4. Bottom to be finished with a good coat of Quigleys Triple A No. 11 hydraulic black asphalt type of paint.

U. Ladder

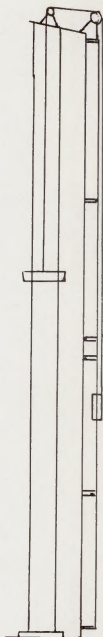
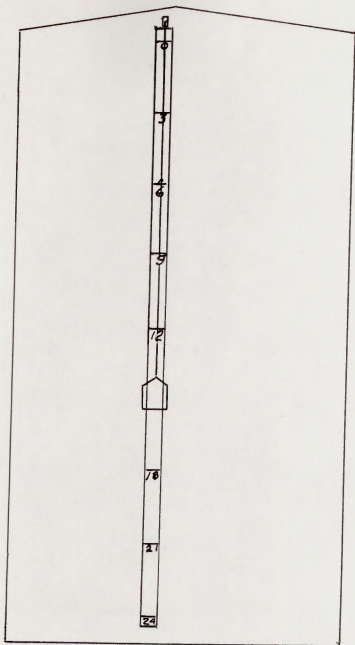
1. All steel connections with
2. angles 1/2" x 10" round steel base
3. welded 10" round steel base
4. angles of 1/2" x 12" with
5. angles at a point approximately 1/2" above bottom
6. of each and
7. angles 1/2" above top of each as shown on each
8. and fastened back to each
9. Ladder to be fastened to side of each with
10. angles 1/2" x 12" round steel, fastened
11. ladder to each approximately 1/2" from each

E. Erection

1. Erection of 1 each, 1/2" x 10"
2. slightly welded to top and sides
3. to be in place and be welded to the frame

F. Paint

1. Erection of each to be painted with a coat of
2. paint and connections with paint and
3. paint
4. Erection to be painted and welded with one coat
5. of "Rustless" paint on each
6. Erection to be painted with a good grade of paint
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PUMP & WELL SYSTEM	
GAUGE	
WATER TANK	
5/15/66	BM.

GAUGE

FOR A WATER TANK

This gauge is adaptable to each size of tank.

The gauge itself is made out of 1 x 8" fir S4S split into sections and bolted to tank to form a continuous run vertically to show the depth of water in the tank.

Painted white (enamel) with a brilliant color for the numerals which indicates the depth. A color should be used, and the size also should be large enough, for an aerial observer to see as he passes by in a plane.

Support brackets should be located top and bottom of each section and located not more than 6 foot apart.

Target and Float in tank should be balanced for them to work up and down in the water and rod respectively.

The target will be guided by two strands of galvanized smooth wire anchored to the top of the tank and bottom so as to let the float work up and down freely.

Pulleys, two sets, to be used on top of tank mounted on brackets so as to allow the float and target cable to roll free, up, over and down along gauge attached to the target.

INDEX

THE WATER TANK

This tank is capable of each side of tank.

The tank itself is made out of 1/2" x 1/2" x 1/2" steel plate
section and built in two sections, the vertical
to show the depth of water in the tank.

Painted white (enameled) with a polished steel for the
which indicates the depth. A float would be used, and the
also should be large enough, for an actual observation to see as
passed by to a glass.

Support brackets should be located top and bottom of each
section and located near each side of tank.

Target not fixed in tank should be between the two in water
up and down in the water and not horizontal.

The target will be guided by two vertical at right angles
also attached to the top of the tank and bottom of the
float and not down itself.

Water, two feet, to be used on top of tank when in use.
so as to allow the float and target to rise and fall freely, up and
down about eight inches to the target.

WATER STORAGE TANK

PRICES FOR VARIOUS SIZE TANKS AS FURNISHED ON AN OPEN END CONTRACT
FISCAL YEAR 1966

Item No.		Quantity	Unit	F.O.B. Vale, Oregon
1.	18,000 gal.	1-2	Each	\$1,286.00
		3-6	Each	1,280.00
1b.	10,000 gal.	1-2	Each	875.00
		3-6	Each	872.00
1c.	5,000 gal.	1-2	Each	480.00
		3-6	Each	475.00
<u>1d. Ladder, steel, mounted on tank if required per lin. ft. \$2.25</u>				
<u>1e. Water level gauge, if required per tank</u>				<u>\$75.00</u>

CONTRACTOR

Steel Fabrication
% Don Rule
Route 3
Caldwell, Idaho
Phone: Middleton 585-2506

STATE OF CALIFORNIA

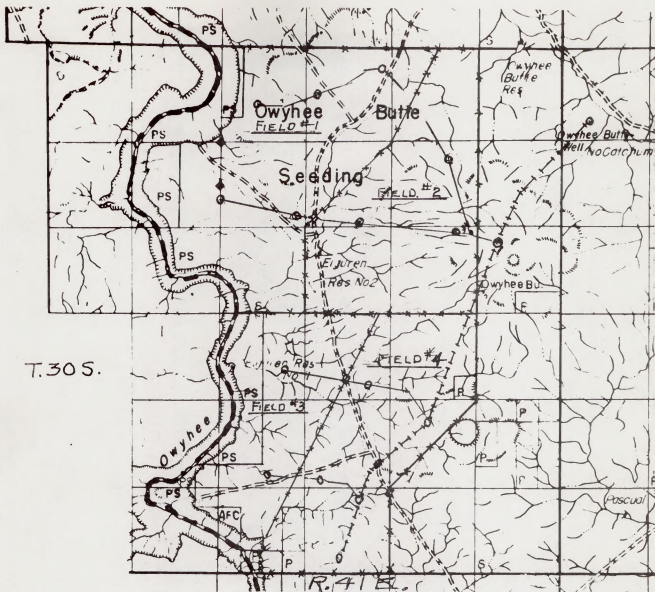
OFFICE OF THE ATTORNEY GENERAL
 1900-1901

No.	Quantity	Unit	Value
1.	15,000	lbs.	\$1,125.00
2.	10,000	lbs.	\$750.00
3.	5,000	lbs.	\$375.00
4.	2,500	lbs.	\$187.50
5.	1,250	lbs.	\$93.75

10. Balance forward \$1,125.00
 11. Total \$3,675.00

EXHIBIT

State of California
 Attorney General
 1900-1901
 Exhibit A
 1900-1901



PUMP & WELL SYSTEM	
TYPICAL	
INSTALLATION	
5/25/66	D.M.



Handwritten notes in a small box at the bottom left, likely providing a title or description of the map. The text is illegible due to fading.

PIPELINES

We are using extensive pipe line systems in connection with our wells with fair to good result. Whenever you have mechanized type of equipment you will always have a certain amount of trouble. It is easier to study these lines out, survey what you will do and find out what you want first before you do it. Good planning will prevent and offset a lot of future trouble.

Our pipe lines consist of plastic tubing used as the pipe from the storage tank to the stock drinking trough of various sizes laid according to engineer plans.

Placing of the pipe in the ground represents a very important phase of the pipe line.

Mechanical trenches - digging a narrow trench to a depth when constant temperatures allow the plastic tubing to rest without too much movement from contraction and expansion and place on a good bed of loose earth and a good layer of earth free from rocks over it presents the best way of laying the plastic tubing.

The most economical laying of plastic tubing is achieved from use of a pipe layer. This pipe layer may be placed on a motor grader with an average penetration of not more than 18 to 20 inches. Or on a pull type of ripper with a penetration of 32 to 42 inches. This type of equipment may be built locally. Consists of placing the tubing into the ground through a curved pipe attached to a ripping tooth. The main thing with this type of equipment it should be used so as to pre-rip the trench once or twice or more times if needed, dependent on type of soil and how rocky an area may be.

The pipe line should always be designed by engineers. Never begin one without a complete engineering design. Grades are important, should be laid on a constant one whenever possible. Air locks should be prevented. Excessive head may develop easily enough due to the dropping of the water through considerable verticle distances. At the bursting points of limitation, relief for the line should be secured. Pressure relief points are to be located at the points of maximum pressure and not to exceed the maximum pressure recommended by the manufacturer. An inexpensive pressure tank may be installed, reloading the line at the correct pressure without any loss of water.

CHAPTER 1

The first thing I noticed when I stepped out of the car was the smell of the sea. It was a salty, briny scent that seemed to fill the air. I took a deep breath and felt a sense of peace wash over me. The sun was shining brightly, and the waves were crashing against the shore. It was a beautiful sight, and I knew that I was in for a great day.

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Basic information for designing a pipe line should include:

1. Location of proposed well.
2. The approximate area to be served.
3. The number of livestock to be served throughout a season of use.

Then the engineer should design an adequate plan and provide all data needed for the installation and use of the system.

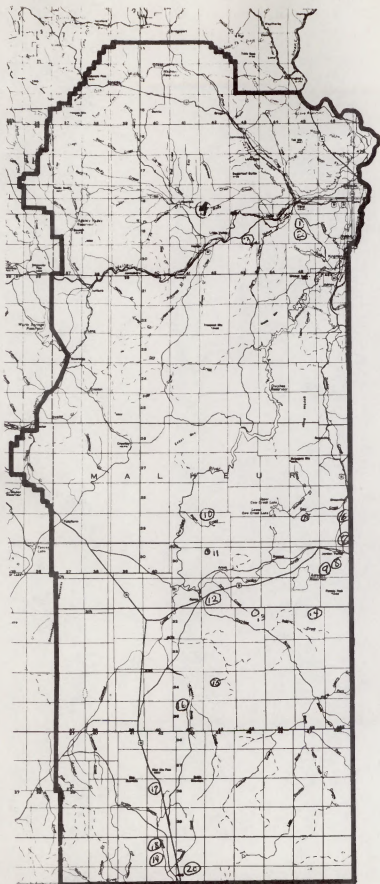
NOTE: Information for this report is to be used

1. Location of property well.

2. The hydrologic test to be used.

3. The number of locations to be tested (minimum 2)
reason of use.

Then the engineer should design an adequate test and provide all
data needed for the investigation and use of the system.



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VALE DISTRICT

WELLS

- | | |
|--------------------------|------------|
| 1. North Harper Well | BLM Power |
| 2. Page Well | BLM Power |
| 3. Vines Hill Well | Com. Power |
| 4. Dahle Well | Com. Power |
| 5. Downey Canyon Well | BLM Power |
| 6. Hooker Creek Well | BLM Power |
| 7. Jordan Valley Well | BLM Power |
| 8. Soldier Creek Well | BLM Power |
| 9. Brickly Springs Well | BLM Power |
| 10. Bogus Creek Well | BLM Power |
| 11. Owyhee Butte Well | BLM Power |
| 12. Rome Well | BLM Power |
| 13. Monument Well | BLM Power |
| 14. Gluch Seeding Well | BLM Power |
| 15. Grafton Well | BLM Power |
| 16. Cherry Well | Jensen-Gas |
| 17. Blue Mountain Well | Com. Power |
| 18. McDermitt Well No. 1 | Com. Power |
| 19. McDermitt Well No. 2 | Com. Power |
| 20. Andy Fife Well | Com. Power |

PUMP & WELL SYSTEM

LOCATION OF WELLS

VALE O-3

5/25/66

D.M.

APPENDIX

CLORALIA

HELPFUL ITEMS

The following are miscellaneous items that may be helpful to a planner or installer either way.

1. Pipe: Use of galvanized standard pipe as a riser pipe in a well.

- A. Always use a good grade of U. S. Standard Pipe, galvanized.
- B. Because of strength limitations of Schedule 40 pipe, the maximum setting of a pump allowed will be 600 feet. For deeper settings, the top portion of the riser pipe which exceeds 600 feet must be Schedule 80 galvanized pipe.

2. Check Valve: Use of

- A. If the pressure head against a pump check valve is 500 feet or less, no additional check valve is required.
- B. If the pressure head exceeds 500 feet a surface check valve must be used.
- C. If the pump setting exceeds 500 feet, an intermediate verticle check is to be installed at 500 feet above pump.

3. Screen:

- A. The elements of well completion include installing a well screen in a sand or gravel formation. The well screen supports the formation, prevents caving and permits water to enter the well, through closely spaced openings. The screens are made with openings of various sizes to fit the gradation of the water bearing sand.
- B. Various types are available namely:
 - 1. Drive well points.
 - 2. Continuous slot screen.
 - 3. Pipe base screen.
 - 4. Brass tubular screen.

The following are the results of the examination of the evidence submitted in connection with the above-captioned case.

1. The following are the results of the examination of the evidence submitted in connection with the above-captioned case.

2. The following are the results of the examination of the evidence submitted in connection with the above-captioned case.

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10. The following are the results of the examination of the evidence submitted in connection with the above-captioned case.

11. The following are the results of the examination of the evidence submitted in connection with the above-captioned case.

12. The following are the results of the examination of the evidence submitted in connection with the above-captioned case.

QUIGLEY TRIPLE-A
INDUSTRIAL PAINT

This industrial paint combines the three essentials for a permanent protective covering for iron, steel and galvanized surfaces, concrete, stone, brick, cork insulation, etc. It is alkali-resistant, water-resistant, and acid-resistant.

Can be applied with either spray or brush. Will cover 300 to 400 sq.ft. per gallon on iron or steel. On concrete, stone, wood or brick, will cover about 100 sq.ft. first coat, and 200 or more sq.ft. the second coat. Dries by evaporation, only, not by oxidation, like oil paint and will not, therefore, crack, chip, or peel.

Triple-A Black No. 10 is recommended for metal, concrete, or other surfaces where protection is of sole importance and color decoration not necessary. Must not be mixed with other Triple-A colors and can not be used over newly painted surfaces. Is effective when applied to rust surfaces and improves adhesion where hot enamels are to be applied later.

All colors, except No's. 10 and 20 may be used on oil paint, etc., or paint may be applied over them.

No. 20 Heavy Duty is a long-life coating, for use under the most severe weather conditions, and is especially adapted for the most extreme corrosive conditions in mining, industrial and railroad equipment.

QUIGLEYS TRIPLE-A INDUSTRIAL PAINT

<u>No's.</u>	<u>Color</u>	<u>Gallons Cans, each</u>	<u>5 Gallon Cans, each</u>
10	Black	3.00	13.95
20	Heavy Duty Black	3.10	14.45
105	Gloss Black	3.10	-----
*111	Hydraulic Black	3.00	13.90
120	Green	7.00	-----
125	Red	7.00	-----
127	Fire Dep't. Red	7.30	35.20
128	Orange	7.30	-----
130	Gray	7.00	33.70
132	Blue	7.00	-----
140	Yellow	7.30	-----
145	White	7.00	-----
160	Dark Gray	7.00	-----

*Also recommended for surfaces where electric insulation is desired.

THINNER

<u>No's.</u>		<u>Quart Cans</u>	<u>Gallon Cans</u>	<u>5 Gal. Cans</u>
1	For No's. 10 and 20, each	\$0.95	\$2.50	\$11.95
100	For No's. 105 to 380, each	.90	2.40	-----

READY MIXED ALUMINUM COATINGS

<u>No's.</u>		<u>Quart Cans</u>	<u>Gallon Cans</u>	<u>5 Gal. Cans</u>
700	Interior, each	\$1.35	\$4.30	\$-----
705	Exterior, each (S.L. Only)	1.40	4.35	20.95
715	Asphalt Base, each	----	----	-----

HEAT RESISTANT (AS ABOVE)

326	Exterior, 500 Deg. F., each		7.40
336	Exterior, 1,200 Deg. F., each		18.30

ZINC CHROMATE PRIMER

For both shop coat and field priming of metal of metal surfaces, and spot coating in the field. Produces a firm bond, dries rapidly and gives the necessary tooth for successive coats while preventing corrosive influences from attaching the underlying metal.

<u>No's.</u>		<u>Gallon Cans</u>	<u>5 Gallon Cans</u>
800	Yellow, each	\$5.60	\$-----
800R	Red, each	5.05	24.70

Cans in a case 4

Quigley's Triple-A Industrial Paint principle source is the Salt Lake Hardware Company - Boise, Idaho and Salt Lake City, Utah.

TABLE

Ref.	Item	QTY	Unit	Price
1	100 lbs. 100.00	100	lbs.	1.00
2	100 lbs. 100.00	100	lbs.	1.00

TABLE

Ref.	Item	QTY	Unit	Price
100	100 lbs. 100.00	100	lbs.	1.00
101	100 lbs. 100.00	100	lbs.	1.00
102	100 lbs. 100.00	100	lbs.	1.00

TABLE

Ref.	Item	QTY	Unit	Price
100	100 lbs. 100.00	100	lbs.	1.00
101	100 lbs. 100.00	100	lbs.	1.00

TABLE

The data in this table was obtained from the records of the company and is not intended to be used for any other purpose. The data is for information only and is not to be used for any other purpose.

Ref.	Item	QTY	Unit	Price
100	100 lbs. 100.00	100	lbs.	1.00
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TABLE

The data in this table was obtained from the records of the company and is not intended to be used for any other purpose. The data is for information only and is not to be used for any other purpose.

DETERMINING THE CAPACITY OF A PUMP

BY HORIZONTAL OPEN DISCHARGE METHOD

To estimate the pumping capacity of any given unit, construct an L shaped measuring instrument similar to that shown in the accompanying sketch. The shorter side should be 4" long. The longer side may be any convenient length marked in inches. With the water flowing from the horizontal open discharge, place the long side of the L along the top of the discharge pipe, allowing the shorter side to hang downward as shown in the drawing. Slide the L along the pipe until the 4" length barely touches the flow of water. Note the distance ("X") traveled by the flow of water before it drops 4". Presume, for example, that the distance is 15" and the inside diameter of the pipe (indicated by "D") is 3". Consulting the table below, find 15" in the column at extreme left headed "Horizontal Dist. X (Inches)." Then move horizontally to the right to the column showing the pipe diameter being used (3"). The discharge rate is found to be 183 gallons per minute.

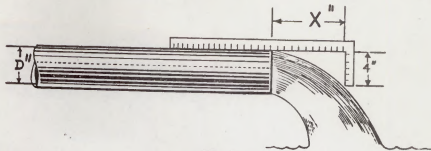


Fig. 1

Horiz. Dist. X (Inches)	DISCHARGE RATE (Gallons per minute)												Average Velocity
	Nominal Pipe Diameter												
	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"	
4	5.7	9.8	13.3	22.0	31.3	48.5	83.5						2.1
5	7.1	12.2	16.6	27.5	39.0	61.0	104	163					2.6
6	8.5	14.7	20.0	33.0	47.0	73.0	125	195	285				3.1
7	10.0	17.1	23.2	38.5	55.0	85.0	146	228	334	580			3.7
8	11.3	19.6	26.5	44.0	62.5	97.5	166	260	380	665	1060		4.2
9	12.8	22.0	29.8	49.5	70.0	110	187	293	430	750	1190	1660	4.7
10	14.2	24.5	33.2	55.5	78.2	122	208	326	476	830	1330	1850	5.3
11	15.6	27.0	36.5	60.5	86.0	134	229	360	525	915	1460	2200	5.8
12	17.0	29.0	40.0	66.0	94.0	146	250	390	570	1000	1600	2220	6.2
13	18.5	31.5	43.0	71.5	102	158	270	425	620	1080	1730	2400	6.9
14	20.0	34.0	46.5	77.0	109	170	292	456	670	1160	1860	2590	7.4
15	21.3	36.3	50.0	82.5	117	183	312	490	710	1250	2000	2780	7.9
16	22.7	39.0	53.0	88.0	125	196	334	520	760	1330	2120	2960	8.4
17		41.5	56.5	93.0	133	207	355	550	810	1410	2260	3140	9.1
18		60.0		99.0	144	220	375	590	860	1500	2330	3330	9.7
19				110	148	232	395	620	910	1580	2520	3500	10.4
20					156	244	415	650	950	1660	2660	3700	10.6
21						256	435	685	1000	1750	2800		11.4
22							460	720	1050	1830	2920		11.8
23								750	1100	1910	3060		12.4
24									1140	2000	3200		13.0

For other than standard diameter pipes the flow may be determined by using the following formula:

$$Q \text{ gpm} = X \cdot 1.28 D^2 \text{ where } D = \text{Inside pipe diameter}$$

$$X = \text{Horizontal open flow for drop of 4".}$$

PROCEDURE IN DETERMINING DISTANCE TO WATER LEVEL

Install sufficient 1/8" or 1/4" pipe (copper tubing may also be used) in the well so that end of pipe extends 10 to 20 feet below lowest possible pumping level. Be sure that all joints are absolutely air-tight by using white-lead or pipe compound. THE EXACT LENGTH OF PIPE OR TUBING IN THE WELL MUST BE KNOWN AND THIS INFORMATION SHOULD BE RECORDED.

Attach upper end of pipe or tubing securely at top of well. Connect a tire valve to the air line at the top of the well and also a pressure gauge. Next, connect a tire pump or other air supply to the air line and pump air into the line until the pressure gauge reaches a maximum reading. This reading is the point at which further supply of air will not increase the reading to any higher value. Record the gauge reading.

Let X = Depth to water (in feet) unknown

Y = Known length of air line (in feet)

Z = Water pressure on air line, obtained from pressure gauge reading. Altitude type gauge reads directly in feet of water. If gauge reads in pounds convert to feet by multiplying by 2.31.

$$X = Y - Z$$

Distance to water = length of air line minus gauge reading (feet).

EXAMPLE: Assume that the air pipe is 100 ft. long from center of gauge to bottom end of pipe and that the highest reading of the gauge needle is 15 lbs. = $15 \times 2.31 = 34.6$ feet.
Distance to water = $100 - 34.6 = 65.4$ feet.

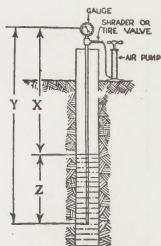


Fig. 2

DETERMINING THE CAPACITY OF A RUM



EXPERIMENTAL DATA

The following table shows the experimental data for the determination of the capacity of a rum. The data is presented in two columns: 'VOLUME OF WATER' and 'VOLUME OF RUM'. The values are given in milliliters (ml).

VOLUME OF WATER (ml)	VOLUME OF RUM (ml)
0	0
10	10
20	20
30	30
40	40
50	50
60	60
70	70
80	80
90	90
100	100

VOLUME OF WATER (ml)		VOLUME OF RUM (ml)	
1	2	1	2
0	0	0	0
10	10	10	10
20	20	20	20
30	30	30	30
40	40	40	40
50	50	50	50
60	60	60	60
70	70	70	70
80	80	80	80
90	90	90	90
100	100	100	100

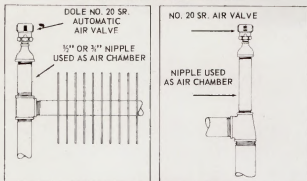
CONCLUSION

The experimental data shows that the volume of water and the volume of rum are directly proportional. This means that the capacity of a rum is equal to the volume of water it contains.

REFERENCES

1. "The Capacity of a Rum", *Journal of Physics*, 1950, 15, 1-10.
2. "The Capacity of a Rum", *Journal of Chemistry*, 1951, 16, 1-10.
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4. "The Capacity of a Rum", *Journal of Biology*, 1953, 18, 1-10.
5. "The Capacity of a Rum", *Journal of Geology*, 1954, 19, 1-10.

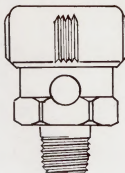
SUGGESTED INSTALLATIONS



THE DOLE VALVE CO.
Plumbing & Heating Div.
Morton Grove, Ill.

X-5533

INSTRUCTION SHEET



Dole No. 20 Sr.
Automatic
Hot Water Air Valve

Designed to perform
 three important functions

1. Manual Venting
2. Automatic Venting
3. Complete Shut-off

Part No. 2467217
 and Pat. Pending

THE DOLE VALVE COMPANY, MORTON GROVE, ILLINOIS

INSTALLATION

1. Drain Heating System (or follow your preferred procedure for installing Air Valves on Hot Water Heating Systems.)
2. Install on heating units.
3. When system is filled with air, such as when starting up a new job, or one that has been drained, fast air elimination can be had by venting manually.

Dole No. 20 Sr. Air Valves can be installed on radiators, convectors, baseboard, mains and high points in the system.

They may be installed in any position except upside down.

They should be installed at a high point, where air can accumulate. It is necessary that provision be made to collect air that accumulates between venting cycles. Unless the vented member has an integral air accumulator, a nipple and fitting assembly can be used as an air chamber.

Dole No. 20 Sr. Air Valves are guaranteed against manufacturing defects for one year. This guarantee is limited to replacing defective valves. The Dole Valve Co. cannot assume any responsibility for water damage as a result of deterioration of valve parts due to chemical content of water, boiler compounds, cleansing agents or physical damage.

OPERATING INSTRUCTIONS

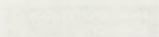


MANUAL SHUT-OFF
 POSITION



AUTOMATIC
 POSITION

1. Manual Shut-off:
 Merely close the valve by turning clockwise as far as it will go. In this position, the word "open" cannot be seen.
2. Automatic Venting:
 Set valve by turning selector dial counter-clockwise as far as it will go. In this position the word "Open" will be in view. The word "Open" is inverted so it can be more easily read from a position above the valve.
3. Manual Venting:
 Open valve by turning dial to position between shut-off and automatic positions.



THE UNITED STATES OF AMERICA



THE UNITED STATES OF AMERICA
DEPARTMENT OF THE ARMY
WASHINGTON, D. C.

THE UNITED STATES OF AMERICA

THE UNITED STATES OF AMERICA

KOHLER

ELECTRIC PLANTS

SALES

BULLETIN

NO. 104-A

OCTOBER 1, 1961

MOTOR STARTING

Motor starting is an important consideration when making an electric plant load analysis. Variables, such as the type of motor and type of starting load must be known before a definite recommendation can be made.

The following maximum motor horsepower ratings will be helpful in recommending a proper size plant.

<u>Size Plant</u>	<u>Max. Motor Horsepower</u>
.5 KVA	Small shaded pole or series
1 KVA	1/4 H.P. capacitor
	1/8 H.P. split-phase
1.5 KVA	1/3 H.P. repulsion-induction
	1/4 H.P. capacitor
	1/4 H.P. split-phase
2 KVA, 2.5 KVA	1/2 H.P. capacitor
	3/4 H.P. repulsion-induction
3.5 KVA	2 H.P. repulsion-induction
5 KVA (single phase)	3 H.P. repulsion-induction
6.25 KVA (three phase)	3 H.P. induction
10 KVA (single phase)	5 H.P. repulsion-induction
12.5 KVA (three phase)	5 H.P. induction
15 KVA (single phase)	7-1/2 H.P. repulsion-induction
18.75 KVA (three phase)	7-1/2 H.P. induction
37.5 KVA (three phase)	10 H.P. induction
56.25 KVA (three phase)	15 H.P. induction
68.75 KVA (three phase)	25 H.P. induction
106.25 KVA (three phase)	30 H.P. induction
143.75 KVA (three phase)	40 H.P. induction

The above recommendations are on the basis of across the line starting of general purpose motors used with normal 50% voltage drop-out contactors.

In all motor starting situations, consideration should be given to the heavy starting current draw as well as the running current requirements. This data can be obtained from the motor nameplate.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
STANDARD - STARTING KVA OF MOTORS

Code letters adopted as a standard by N.E.M.A. are also helpful in determining the starting KVA of a particular motor.

The table lists the code letters and the multiplying factor applicable to the code letter. (Example: Code letter "F" on a 15 H.P. motor, the starting KVA would be 15×5.5 or 82.5 KVA.)

CODE LETTER	STARTING KVA PER H.P. *
A	0 - 3.15
B	3.15 - 3.55
C	3.55 - 4.0
D	4.0 - 4.5
E	4.5 - 5.0
F	5.0 - 5.6
G	5.6 - 6.3
H	6.3 - 7.1
J	7.1 - 8.0
K	8.0 - 9.0
L	9.0 - 10.0
M	10.0 - 11.2
N	11.2 - 12.5
P	12.5 - 14.0
R	14.0 - 16.0
S	16.0 - 18.0
T	18.0 - 20.0
U	20.0 - 22.4
V	22.4 - and up

* Starting KVA per horsepower range includes the lower figure up to, but not including, the higher figure. Example: 3.14 is designated by letter A, 3.15 by letter B.

STANDARD TEST METHOD FOR DETERMINING THE TENSILE STRENGTH OF STEEL

1. This method covers the determination of the tensile strength of steel in the form of flat bars, round bars, and wire. It is applicable to steel of all grades and to all sizes of material. The test is made by pulling the specimen apart in a tensile testing machine. The load is applied gradually until the specimen has reached its maximum strength and then it is broken. The load at which the specimen breaks is the tensile strength. The test is made on a specimen of standard shape and size. The tensile strength is expressed in pounds per square inch (psi) or in kilograms per square centimeter (kg/cm²).

TEMPERATURE	TENSILE STRENGTH
70°F	50,000 psi
100°F	48,000 psi
150°F	45,000 psi
200°F	42,000 psi
250°F	40,000 psi
300°F	38,000 psi
350°F	35,000 psi
400°F	32,000 psi
450°F	30,000 psi
500°F	28,000 psi
550°F	25,000 psi
600°F	22,000 psi
650°F	20,000 psi
700°F	18,000 psi
750°F	16,000 psi
800°F	14,000 psi
850°F	12,000 psi
900°F	10,000 psi
950°F	8,000 psi
1000°F	6,000 psi

NOTE: The tensile strength of steel is affected by the temperature at which it is tested. The values given in this table are for steel of standard composition and are not necessarily the highest values obtainable. For higher values, see Table 1.

